

## CASE STUDY

# A new ECG sign of an accessory pathway in sinus rhythm: pseudo partial right bundle branch block

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## Abstract

It is clinically important to be able to detect the presence of an accessory pathway, as pre-excited atrial fibrillation is a well recognised cause of sudden cardiac death, for which there is a potential "cure" in the form of radiofrequency ablation of the pathway. The classic manifestations such as a shortened PR interval or delta waves may not always be present. In certain patients a pseudo partial right

bundle block pattern—that is, an rSr' complex in lead V1—may be the sole manifestation of a left sided accessory pathway. An electrophysiological mechanism is proposed for this pattern and it is suggested that this pattern may be used as a new ECG sign for diagnosing an accessory pathway in sinus rhythm.

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Keywords: accessory pathway; sinus rhythm; pseudo right bundle branch block

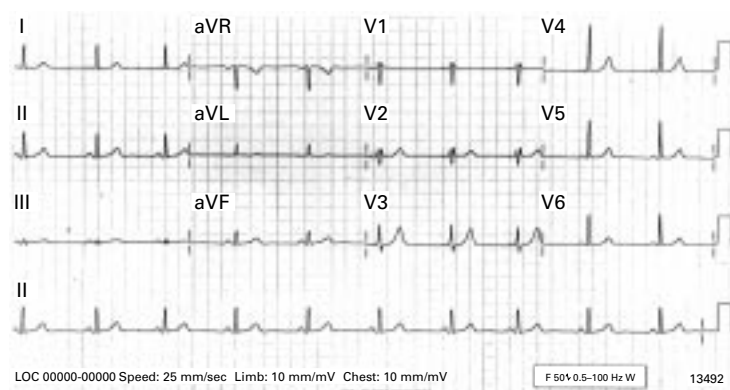


Figure 1 Pseudo partial right bundle block (rSr') pattern in lead V1 but no classic features of pre-excitation in a patient with a left sided accessory pathway.



Figure 2 Disappearance of the secondary r' wave in lead V1 during radiofrequency of a left sided accessory pathway.

The main effects of ventricular pre-excitation by an accessory pathway during sinus rhythm are seen in the first part of the QRS complex on the surface ECG. The degree of pre-excitation seen depends on the degree of its fusion with conduction down the His-Purkinje system.<sup>1</sup> In patients with a combination of rapid AV nodal conduction and usually a left accessory pathway, activation of the initial part of the QRS may be normal, a phenomenon termed inapparent or latent pre-excitation.<sup>2</sup> However, if the accessory pathway happens to insert into the base of the left ventricle, the part of the left ventricle usually activated last by the His-Purkinje system,<sup>3</sup> the total left ventricular activation time may be reduced. This will allow some right ventricular activation to be unopposed, producing a secondary r' wave in lead V1. The net result is a pseudo partial right bundle branch block (RBBB) rSr' pattern for the QRS complex in V1.

We describe three cases in which the only manifestation of ventricular activation by a left sided accessory pathway was the pseudo partial RBBB pattern.

## Cases

Table 1 summarises the details of the three cases. In all three cases, the PR interval was within normal limits, delta waves were absent,

Table 1 Summary of case details

Case	Sex	Age*	Presentation	ECG during sinus rhythm	
				PR interval	δ wave
1	Male	29	Palpitations	0.12 s	Absent
2	Male	22	Palpitations	0.14 s	Absent
3	Female	30	Syncope	0.13 s	Absent

\*Age at electrophysiology study.

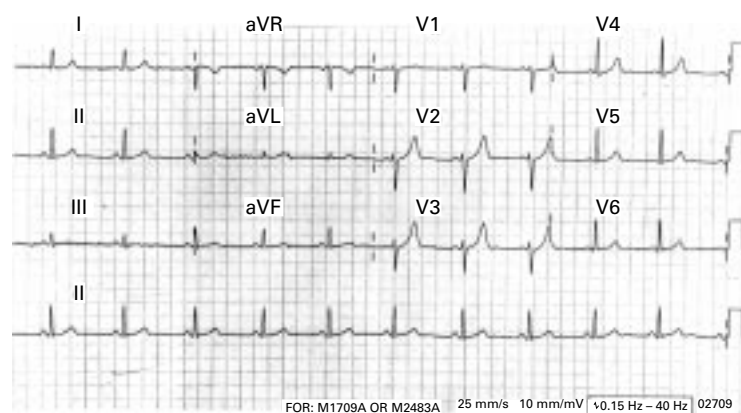


Figure 3 Disappearance of pseudo partial bundle branch block pattern in lead V<sub>1</sub> after the successful radiofrequency ablation of a left sided accessory pathway in the same patient as in fig 1.

and the width of the QRS complex was  $< 0.12$  seconds. However, pseudo partial RBBB was clearly evident on the surface ECG during sinus rhythm (fig 1). In all three cases, a left sided accessory pathway was identified and successfully ablated, which coincided with the disappearance of the pseudo partial RBBB pattern (fig 2). Post ablation ECG (fig 3) the next day showed the continuous absence of the pseudo partial RBBB pattern but no change in either the PR interval or the width of the QRS complex in comparison to the pre-ablation one.

### Discussion

These three cases show that a secondary r' wave in lead V<sub>1</sub> may be the only manifestation of a left sided accessory pathway during sinus

rhythm. That this is caused by the accessory pathway is shown by its immediate disappearance when the pathway is ablated. The mechanism proposed is that the accessory pathway activation of the left free wall is not early enough to affect the beginning of the QRS, yet reduces the total left ventricular activation time sufficiently to allow the terminal part of right ventricular activation to be unopposed, thus producing the secondary r' wave observed. This is supported by the fact that the PR interval and the width of the QRS complex are unaffected by successful ablation of the pathway.

The clinical significance of this sign is twofold. First, in patients with palpitations, an rSr' pattern in lead V<sub>1</sub> in the presence of a normal QRS width and a normal PR interval should raise suspicion of the possible existence of an antegradely conducting left sided accessory pathway. This can be further assessed with either adenosine or an electrophysiology study. Second, the disappearance of this pattern may be the only manifestation of the successful ablation of such a pathway visible on the surface ECG. This will be useful not only at the time of the initial radiofrequency ablation but also at subsequent follow up.

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